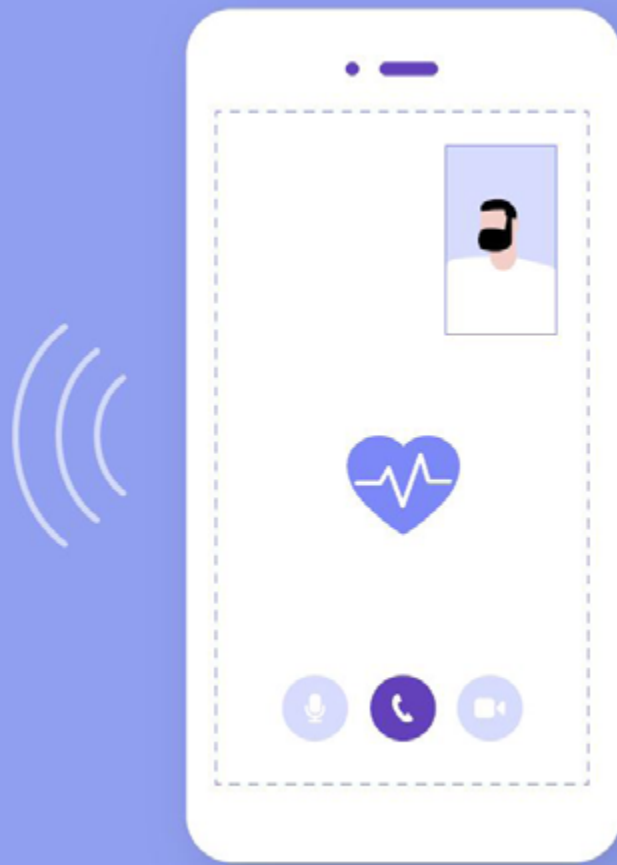# Health Systems And Their Technological Innovations

GeneXus™

The health care system has experienced widespread shifts on all fronts because it is at the heart of the pandemic, of course, but also due to the way in which it has forced the **rapid design of new processes and the consolidation of others.**

This article discusses some of these new processes and software solutions created to assist the **health sector:**

• Efficiency of online appointments in Argentina.

• Telemedicine and the benefits of treatments provided remotely in Argentina and Uruguay.

• Mobile applications to answer COVID-19 queries and organize volunteer work in Brazil and Uruguay.

• Exposure alerts system in Coronavirus UY app in Uruguay.

• Solutions for coronavirus testing in Mexico and Uruguay.

• IoT-based monitoring of at-risk patients in Uruguay.

Argentina: Solutions For Online Appointments And Telemedicine

In Argentina, two solutions were implemented: one with a positive impact on several sectors by innovating to provide online appointments, and another based on telemedicine that makes health care available to thousands of patients and users in different provinces.

Online appointments by Legado IT. Through its **Next Manager** solution, it addresses the mandatory requirement in Argentina to make an appointment before going in person to receive attention. With this solution, **appointments are made online on the web or from a mobile phone,** in order to avoid crowding.

Next Manager is a multi-company solution that can be integrated into other IT solutions, such as customer databases and chatbots, among others, to enhance the referral process and the effectiveness of services across different sectors of the organization. **The integration of GeneXus with IBM's AI** allows for implementation in multiple languages, which also helps to transcend borders.

The solution can be customized –in terms of either functionality or look & feel– and provides self-service through a **virtual totem** with a simple link. For facilities providing essential services, where it is necessary to apply and ensure social distancing, Next Manager also supports the configuration of **physical totems.**

Since its deployment, it is being used in offices, financial entities, pharmacies, vaccination centers, optical shops, travel agencies, prepaid health care centers and almost a hundred service points, throughout **11 provinces of Argentina.**

Tekhne, in turn, has integrated **Telemedicine** into its hospital system to provide services to its clients through digital media. Some of the system's most important features are its flexibility and interoperability, which allows entering data into **Single Medical Records.**

Thus, the integration of the telemedicine module made it possible to reschedule the in-person visits that were cancelled due to the pandemic. In addition, it also facilitated outreach actions; i.e., to seek out at-risk patients to deliver preventive care and treatment, thus avoiding non-essential trips to health care providers. .

This full web system was developed with GeneXus; also, it can be generated in languages such as Java or .NET, and run on the most popular database engines on the market. The solution is integrated with Jitsi –a video conferencing, VoIP, and instant messaging application for video consultations on the system. It features the following telemedicine application modules: Video Consultation, Appointment Scheduling, Online Payments linked to the financial institution for validation and use of the consultation service, as well as Billing module, Online Pharmacy, Health Records (electronic medical record).

This integration was deployed in **less than a month** by 2 developers, and has benefited more than **550,000 people.**

This integration was deployed in less than a month by 2 developers, and has benefited more than 550,000 people.

Brazil: Pronto App In Blumenau To Respond To Queries About COVID-19

In just **two days**, the **Municipality of Blumenau** in Brazil developed an application that monitors the COVID-19 crisis.

This application is **Pronto Mobile**, an app of the Municipality's Health Department designed to facilitate people's access to health services, and monitor patients diagnosed with COVID-19 or who are suspected of having the disease. The tool is part of a strict process set up by a decree of the Mayor of Blumenau to monitor the pandemic.

The solution was developed by **i4 Intelligence for Innovation**, a regional distributor of GeneXus Brazil that creates solutions based on **Artificial Intelligence.**

"GeneXus' Low-Code technology, which automates traditional programming languages, has allowed us to focus on the problem and not on the programming. In this way, we were able to deliver a tool to the population of Blumenau in a very short time," highlights Eric Boeing, Consultant and Head of Development at i4.

Since it was released approximately one month ago, **8,000 individuals,** including both positives and negatives, have already been monitored by the application and now there are at least 700 cases still being monitored. The period of monitored social isolation is 14 days for positive cases and three days for suspicious cases.

«GeneXus' Low-Code technology, which automates traditional programming languages, has allowed us to focus on the problem and not on the programming. In this way, we were able to deliver a tool to the population of Blumenau in a very short time.»

Eric Boeing. Consultant and Head of Development at i4.

Mexico: Fast Processing Of Tests And Generation Of Reports About COVID-19

[Laboratorios del Chopo](#), is a Mexican laboratory that for years has been using a mobile application to follow up on medical tests.

In the emergency context of the pandemic, they had to **adapt their point-of-sale system** so that COVID-19 tests could be scheduled beforehand to avoid crowding of patients in their facilities.

As part of this adaptation, an appointment book was created for patients to schedule a time and date for the test with a phone call. Once the results are issued by the diagnostic center, they are sent through the multiple electronic channels available to the laboratory (web, app and email).

To provide reliable and timely results, as well as to prevent human errors, **analytical interfaces** were created. These interfaces receive the results generated by the analytical equipment that processes SARS CoV-2 (COVID-19) tests through Excel, text or XML files, and are integrated with the patients' information to obtain the result. This allows them, on one hand, to **quickly process the data** and, in this way, generate reports on positive and negative cases, as well as keep track of those that are still pending. On the other hand, it **reduces by at least five times the time in which the results are issued,** thus benefiting both the patient and the treating physician.

Due to the current context, and at the request of the Mexican Government, Laboratorio Médico del Chopo and the other laboratories licensed to perform COVID-19 tests must report all the results of the tests performed on a daily basis. Chopo had to upload an average of **1,000 results per day**, which meant a full day's work. To streamline this activity, a system was developed that makes it possible to upload the data from this number of records within **10 to 15 minutes** using **web services** for communication between both platforms (those of the lab and of the Mexican Government).

Another request from the health authorities in Mexico was to receive information about the patients' clinical data, treatment and epidemiological background, for which an application was developed where the patient answers an electronic survey for that information to be integrated with the result issued by the lab. All the adaptations to the system and new functionalities were made in an **iterative way with a team of 6 developers in 2 months.**

From March to August 2020, **Laboratorio Médico del Chopo processed over 75,000 COVID-19 tests.**

Uruguay: Telemedicine, Coronavirus.uy, Drive Thru Testing And Iot-Based Monitoring

The telemedicine component of DVelop had already been implemented two years ago to offer Summum's customers the option to make video calls with doctors. The module is integrated with the medical history, pharmacy and calendar modules to make an appointment (online or in person) with a specialist or laboratory. Functionalities were added that, at the time, were designed to enhance the UX of private medical insurance customers.

When in March 2020 a voluntary quarantine was adopted in Uruguay, all the health care providers cancelled non-urgent consultations and surgeries to allow most patients to remain in their homes in order to control the pandemic and prevent its spread. In this context, they all had to transform quickly to **operate online**. DVelop, which already had its **video call** solution, received an urgent request to integrate the component with other health care providers. That's how **WorkWithPlus for Video-Call** was created, completely focused on providing video conferencing capabilities, which can be integrated into different platforms developed with GeneXus.

This solution **was quickly implemented in SUAT emergency service and the Coronavirus UY app** to monitor positive cases of COVID-19, and has recently been integrated into some health centers in northern Brazil.

The speed of implementation –1 week in this case– is critical, because in the context of a pandemic it doesn't make sense to delay the development of a solution that affects millions of people: "Being able to have a huge impact on the population in a few days and at a very low cost is the great advantage of this solution," comments Agustín Napoleone, CCO at DVelop Software Solutions. Within only 2 months, thousands of patients have received care via telemedicine in Uruguay.
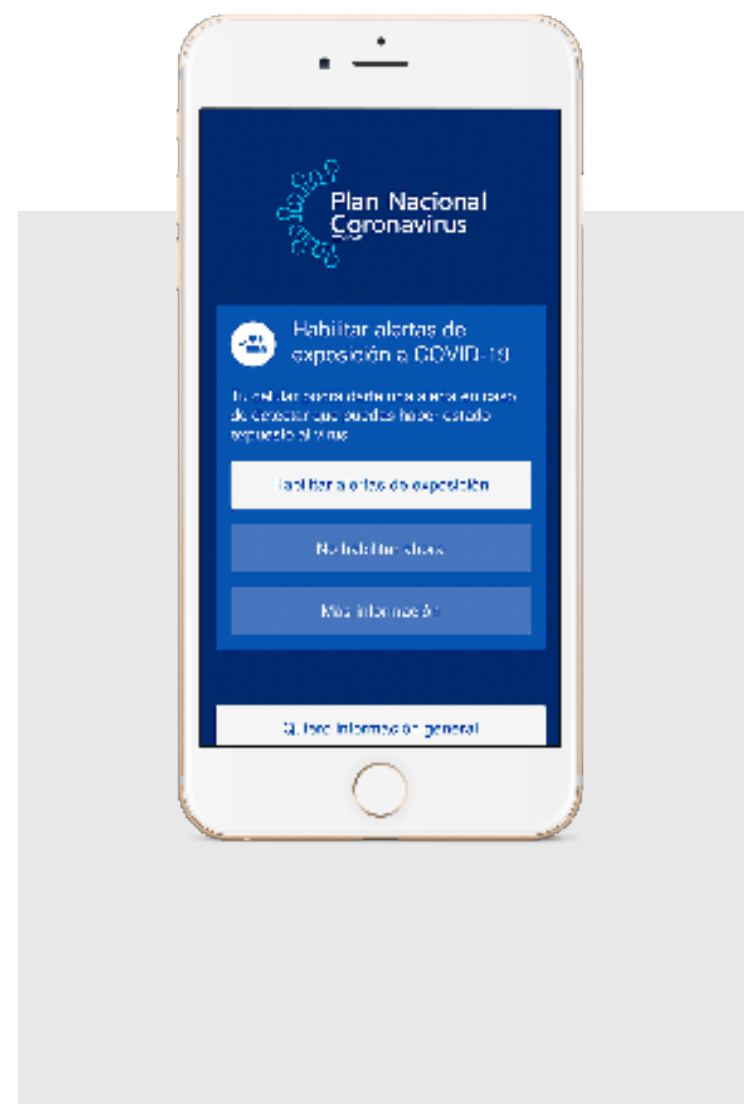
Another important solution is [Coronavirus UY](#) , the Uruguayan Government's application, which is the result of a very fast development that integrated several technology companies of the country with platforms of the Ministry of Public Health (MSP) and all the health care providers, both private and public. COVID-19 reached Uruguay on March 13 and **two weeks later,** the Coronavirus UY app, developed with GeneXus, had already been published on Google Play and Apple Store.

Thanks to this fast response, which was accompanied by other strong public and social measures, Uruguay has managed to keep the feared exponential propagation curve flat, ranking among the top 10 countries in the world that address COVID-19 effectively and efficiently. The country has also been praised by the CEOs of **Google and Apple.**

At present, **Coronavirus UY** provides a safe method of self-assessment without overloading phone lines and avoiding movements of people, helping to improve care for those who suspect they have COVID-19. It also has features such as **drive-through testing** and **telemedicine** for those who test positive. All requests for information and case reports in Uruguay are handled through this platform, which has reached almost one million people (27% of Uruguay's population).

The GeneXus Technology has allowed for the **development** of this state-of-the-art system with multiple levels of interaction in **record time,** and has helped to implement it in an agile, flexible and scalable way to solve a global, mission-critical problem.

This Uruguayan technology has also allowed for the fast integration of a system developed by the leading companies **Apple and Google;** it is called **contact tracing** and uses cell phones' **Bluetooth** feature to receive alerts of proximity or exposure to a person who has been diagnosed with COVID-19. In turn, whoever has the virus will be able to collaborate – subject to their consent– by sharing that signal from their mobile phone (which does not send personal or geographic location data). More than 600,000 users in Uruguay alone have already downloaded the application.

The **drive thru** COVID-19 test, implemented by the the Biotechnology company ATGen with an online appointment feature developed by GeneXus Consulting, is another positive aspect of using physical distancing to stop the spread of the virus.

The drive thru method allows patients to be tested without getting out of their car, thus avoiding contact between staff and users.

ATGen was the first private lab in Uruguay to offer this test for detecting SARS-CoV-2; to date, (August 2020) it has analyzed **more than 40,000 studies** in close collaboration with the country's health authorities, of which **6,000** were conducted in this way.

ATGen's system is constituted by a platform including a **digital calendar** developed by **GeneXus Consulting**, with the primary objective of avoiding crowding and previously identifying the users who come to take the test. The test can be scheduled in several ways: through the web, through health care providers, or it can be referred via the Coronavirus UY application that centralizes diagnostic data.

This software solution was **developed and implemented jointly by ATGen and GeneXus Consulting in 10 days.** The **K2BHealth** technology platform integrated with the **Payment Gateway** functionality (e-commerce service provider that authorizes payments to electronic businesses) was used for this purpose. It is also integrated with **the Coronavirus UY APP** in order to centralize data from the entire country simultaneously.

To date, (August 2020) it has analyzed more than 40,000 studies in close collaboration with the country's health authorities, of which 6,000 were conducted in this way.

Software Solutions For Special Needs:

GeneXus Consulting also served a particularly vulnerable population in this pandemic, the elderly.

At the request of the **Salud.uy** sector, the Ministry of Public Health (MSP) created a solution to assess the health status of all **nursing homes** –community homes for the elderly– in the country. To this end, in only **2 days** GeneXus Consulting developed an application for recording data from the facilities (staff and residents) and monitoring of symptoms related to COVID-19.

The application released at the height of the pandemic has proven useful to track 1,270 nursing homes housing **10,000 seniors** (in addition to 3,500 staff). Another piece of good news is that it will continue to work for the MSP's oversight function beyond the pandemic.

Another **health care** aspect to be addressed was how to **continue to provide care** online and perform certain tests that could not be suspended, but which posed a risk when they were carried out in person given the patients' vulnerability to COVID-19. A special case is that of people with **coronary risk** who require frequent electrocardiograms and monitoring of cardiovascular function. **Galeno_Sys is a medical device based on the Internet of Things (IoT)**, which records up to 6 ECG (Electrocardiogram) leads by means of disposable electrodes on the patient's chest, providing constant monitoring from any location.

The records are sent wirelessly to a cloud server, where the application analyzes them in **real time** and generates alerts in case of arrhythmias or **heart rhythm abnormalities.**

Last but not least, the **health Volunteers application** designed to ensure the successful provision of health care should be highlighted.

«GXC has been working with Galeno_System for a year; during this time, we implemented the software with all the necessary architecture and security requirements. Basically, the application has a backend for managing the devices and general configurations, which we developed by applying **K2BTools**.»

Marcela Corbo. Product Manager of K2BHealth.

The Public Health Services Department (**ASSE**), **together with the Ministry of Public Health, requested GeneXus Consulting** to develop and deploy an application to streamline the registration of volunteers with different profiles, indicating their availability and location.

The **Volunteers** application works in a very simple way: The demand is entered, and its fulfillment is managed with the supply of volunteers. The volunteers registered during the time of high demand responded to **17,500 queries** and were able to ease the heavy burden of ASSE at the peak of cases. In this way, the volunteers who offered their time to help in Uruguay were organized in an optimal way.

To learn more, download the **Map of GeneXus solutions in Latin America to face the Pandemic.**

info@genexus.com

GeneXus™